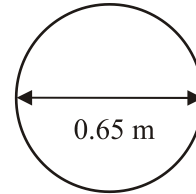1.   The diameter of a wheel on Harry's bicycle is 0.65 m.

        Calculate the circumference of the wheel.
        Give your answer correct to 2 decimal places.

                                                            Diagram **NOT**
                                                            accurately drawn

                                                            0.65 m

                                                            .... m
                                                            (Total 2 marks)

2.   The diameter of a wheel on Harry's bicycle is 0.65 m.

        (a)   Calculate the circumference of the wheel.
                Give your answer correct to 2 decimal places.

                                                            Diagram **NOT**
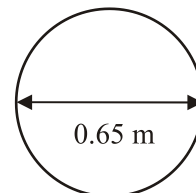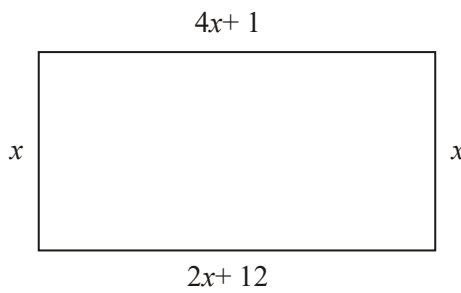   accurately drawn

                                                            0.65 m

                                                            .... m
                                                                        (2)

Harry cycles 1000 metres.

(b)   Calculate the number of turns the wheel makes.

....
                                                                                    (2)
                                                                            (Total 4 marks)

3.

$4x + 1$

x x

$2x + 12$

Diagram **NOT** accurately drawn

The diagram shows a rectangle.
All the measurements are in centimetres.

(a)   Explain why $4x + 1 = 2x + 12$

....
                                                                                    (1)

(b)   Solve $4x + 1 = 2x + 12$

$x = $ ....
                                                                                    (2)

(c)   Use your answer to part (b) to work out the perimeter of the rectangle.

.... cm

(2)
(Total 5 marks)

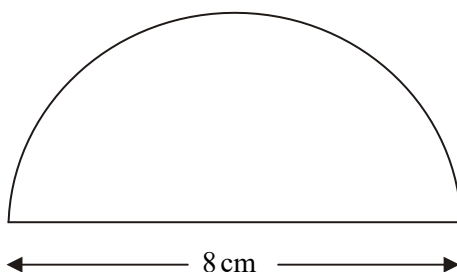**4.**   Here is a tile in the shape of a semicircle.

← ———— 8 cm ———— →

Diagram **NOT** accurately drawn

The diameter of the semicircle is 8 cm.

Work out the perimeter of the tile.
Give your answer correct to 2 decimal places.

.... cm
(Total 3 marks)

5. The perimeter of this triangle is 19 cm.
All lengths on the diagram are in centimetres.

$(t + 4)$

$(t + 3)$

$(t - 1)$
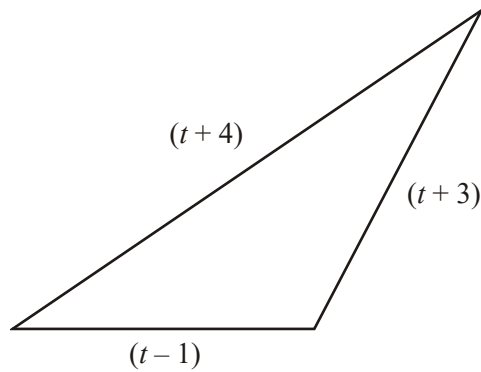
Diagram **NOT** accurately drawn

Work out the value of t.

$t = $ ……………………………

(Total 3 marks)

6.

Diagram **NOT** accurately drawn

$2x$

y y

$3x$
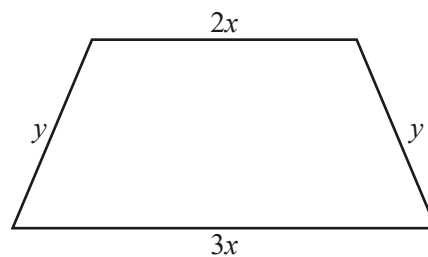
The diagram shows a trapezium.
All the lengths are in centimetres.
The perimeter of the trapezium is P cm.

Find a formula, in terms of x and y, for P.
Give your answer in its simplest form.

$P =$....................................

(Total 2 marks)

1. $\pi \times 0.65$
        $2.04 - 2.05$ 2

                M1 for $\pi \times 0.65$ or 3.14×0.65 or 3.142×0.65
                A1 for $2.04 - 2.05$
                SC Award B1 for 2.0 seen (not 2)

                                                                                         [2]

2.   (a) $\pi \times 0.65$
                $= 2.04 - 2.05$ 2

                M1 for $\pi \times 0.65$ or 3.14×0.65 or 3.142×0.65 oe
                A1 $2.04 - 2.05$
                SC Award B1 for 2.0 seen (not 2)

        (b) $1000 \div$ "(a)"
                $= 487 - 491$ 2

                M1 for 1000 (or 100) $\div$ "(a)"
                A1 for $487 - 491$

                                                                                         [4]

3.   (a)   opp sides are equal   1

                B1 for a correct explanation

        (b) $4x - 2x = 12 - 1$
                5.5 2

                M1 for $4x + 1 - 1 - 2x = 2x + 12 - 1 - 2x$ oe
                A1 for 5.5 or 11/2 or 5½

(c)   '5.5' × 2 + 4 × '5.5' + 1 + 2 × '5.5'+ 12~
       57   2

> *M1 for correct substitution of x = '5.5' into the four expressions*
> *to find the sum of FOUR sides or 8x + 13 seen*
> *A1 ft*

[5]

4. $(0.5 × 3.14... × 8) + 8$
     20.56 – 20.58   3

> *M2 for (0.5 × π × 8) or π × 4 or (π × 8 + 8) or (0.5 x π × 8 +*
> *8) oe*
> *(M1 for π × 8 or 2π × 4; for a value 25.1-25.2 inclusive unless*
> *seen with incorrect working eg πr²)*
> *A1 for 20.56 – 20.58*
> *(**SC**: B2 if M0 scored for 12.56 – 12.58)*

[3]

5. $t = 4\dfrac{1}{3}$ 3

     3t + 6 = 19
     3t = 13

> *M1 for perimeter = t − 1 + t + 3 + t + 4 or better*
> *M1 for 3t + 6 = 19*
> *[Alt: M1 for 19 −(4 + 3 − 1) or 13 seen*
> *M1 for "13" ÷ 3]*
> *A1 for 4.33 or better (accept 13/3)*

[3]

6.   P = 2x + y + 3x + y
     P = 5x + 2y   2

> *M1 for 2x + y + 3x + y*
> *A1 cao*

[2]

1.   Less than one in ten candidates could recall the formula needed for working out the
     circumference of a circle. Many candidates simply doubled or squared the diameter.

     Of those who used πd successfully, some gave their answers rounded to two significant figures
     (2.0) rather than the two decimal places requested.

2.   The most common errors in part (a) were use of the formula for area instead of circumference, and use of the 0.65 as a radius instead of a diameter. In part (b) the success rate was worse. Firstly there were many who thought that you had to multiply instead of divide, using their answer to part (a). Worse still were those candidates who thought that they should use 0.65 to either multiply or divide with 1000. The most common incorrect answer to part (b) was 1538, from $1000 \div 0.65$

3.   **Foundation**

In part (a), candidates often failed to gain the mark when their explanation was unclear. For example, comments like "because the are the same" are ambiguous. To gain the mark, explanations needed to refer to the sides of the rectangle and not the equation.

As in question 24, algebraic methods were few and far between, many attempts leading to an answer of 6.5 ($2x = 12 + 1$) Some candidates correctly found x to be 5.5 and then tried to use this result to answer part (a). Again, in this question, trial and improvement methods were common.

Having found a value for x in part (b), many failed to use it in an attempt to find the perimeter in part (c). Often just the lengths of two sides were calculated leading to incorrect answers of 11 (5.5 + 5.5) or 46, the sum of the two longer sides.

Higher

In part (a) the majority of candidates were able to give a correct explanation although some gave parallel sides rather than equal sides as the reason. Another common error was for candidates to substitute $x = 5.5$ into both expressions instead of using the properties of a rectangle. Only the weakest candidates failed to gain any marks in part (b). The most common errors resulted from incorrect manipulation and often led to $2x = 13$ (instead of $2x = 11$). Some candidates failed to divide 11 by 2 correctly. Those who resorted to trial and improvement were rarely successful. Although there were many fully correct answers in part (c) some candidates struggled to substitute correctly into each of the four expressions. Many made calculation errors. Only a small number of candidates stated that the total perimeter was $8x + 13$ and then made just the one substitution.

4.   **Specification A**

Foundation

Very few correct answers were seen. The errors made by candidates were many and common, including incorrect choice of formula to use (πr^2 quoted and used incorrectly) use of 8 as a radius, incorrect values of π used (though given on the front of the paper), failure to divide by 2, and leaving the answer as the arc, without adding on the straight edge to give the total perimeter.

Higher

A significant number of candidates were unable to gain any marks in this question, this was frequently due to the formula for the area of a circle being used. Common errors were forgetting to halve the circumference, confusing the radius with the diameter or most commonly forgetting to add on the diameter. Many candidates just found the length of the arc rather than the perimeter of the shape.

Specification B

Foundation

The penultimate question on the paper proved to be a challenge for most of the students with nearly 80% of the students failing to make a valid start on this question. Finding half the circumference of a circle was recognised as in $\pi \times 8$ and then dividing this result by 2. It was the next stage that seemed to lie outside the experience of the student as they failed to grasp that they needed to add on the diameter in order to find the perimeter of the tile. There were a number of candidates who used πr^2 to find the perimeter, scoring no marks. Others showed $\pi \times 4$ but then proceeded to divide this by 2, clearly showing they did not know which formula to use.

Higher

Successful candidates saw that they had to find half the circumference and then add on the diameter to get the base. The others unusually fell into 3 categories and gained 2, 1 or 0 marks as appropriate. Firstly, there were those who found the arc length correctly, but did not add on the base (2marks). Secondly, there were those who found the circumference of the full circle, but then did nothing else (1 mark). Thirdly, were the candidates who either confused perimeter with area or confused the formula for the circumference of a circle with the formula for its area. (0 marks).

5.   It was rare to see an algebraic method used to answer this question; most candidates electing to use Trial and Improvement which often resulted in no better than 4.3
A significant number of candidates attempted to remove the numerical elements of the algebraic expressions (+ 4, + 3 and –1), often incorrectly, and then subtracted from 19 and in some cases going on to divide by 3.

6.   Many candidates clearly understood the demands of the question but lost marks by simplifying $y + y$ as y^2 and even $2x + 3x$ as $6x^2$. one mark was awarded if this method was shown, unfortunately many candidates lost both marks by merely giving an answer of $5x+y^2$ without any explanation. Answers of $10xy$ and $5x2y$ were also not uncommon.